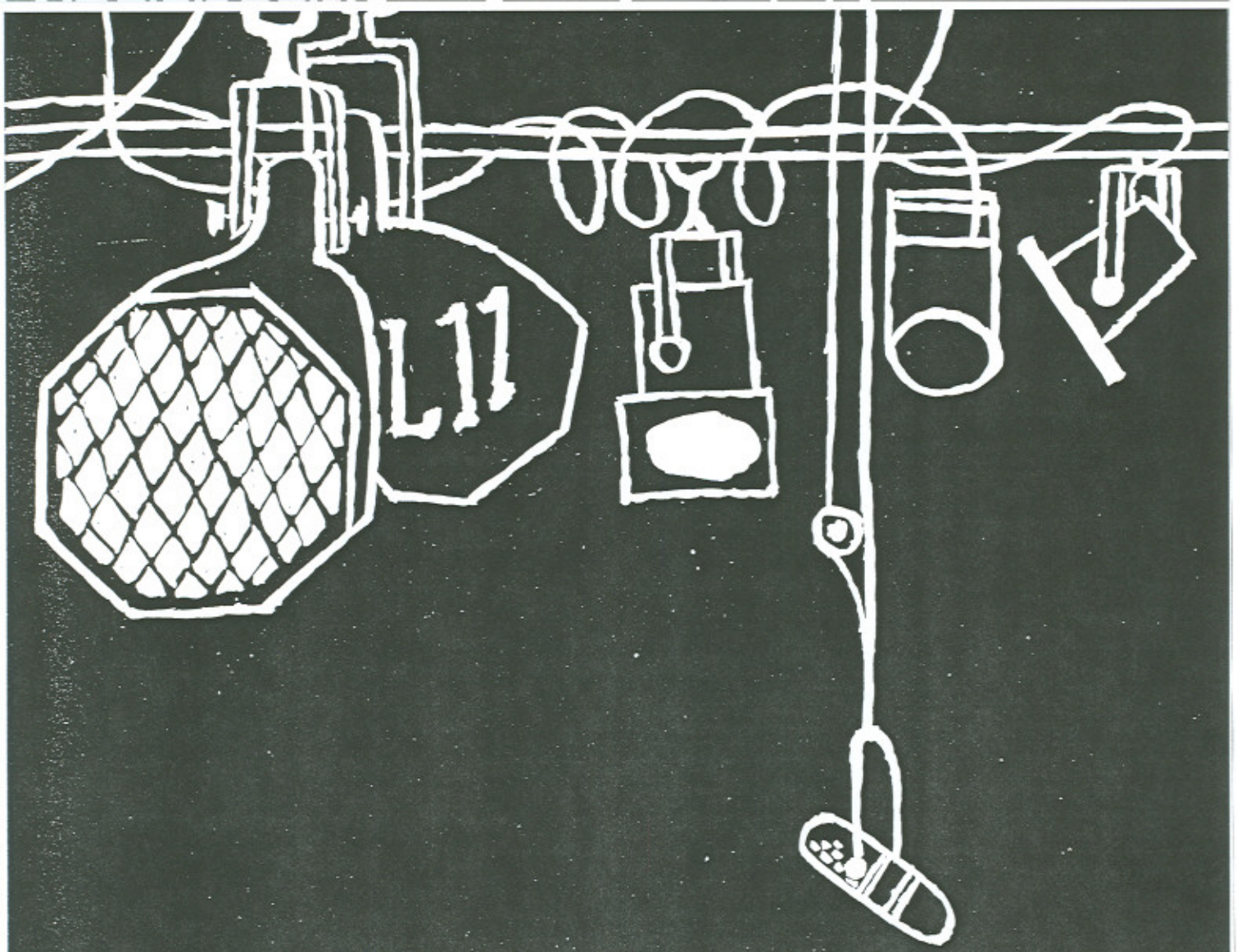

PHYSICAL REQUIREMENTS OF THE ARMED FORCES RADIO AND TELEVISION STATION

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CHAPTER IV

PHYSICAL REQUIREMENTS OF THE ARMED FORCES RADIO AND TELEVISION STATION

Since the physical requirements for radio and television stations are vastly different, they will be discussed in separate sections of this chapter. Many of the audio problems are the same for both radio and television broadcasts, but television adds many complex factors to the audio problem as well as the whole video system.

REQUIREMENTS FOR A RADIO STATION

The space required for the operation of a radio outlet falls into three categories:

1. Necessary space to house and control the program origination sources — this is the studio and control room area.
2. Space required for the transmitter and antenna.
3. Administrative space.

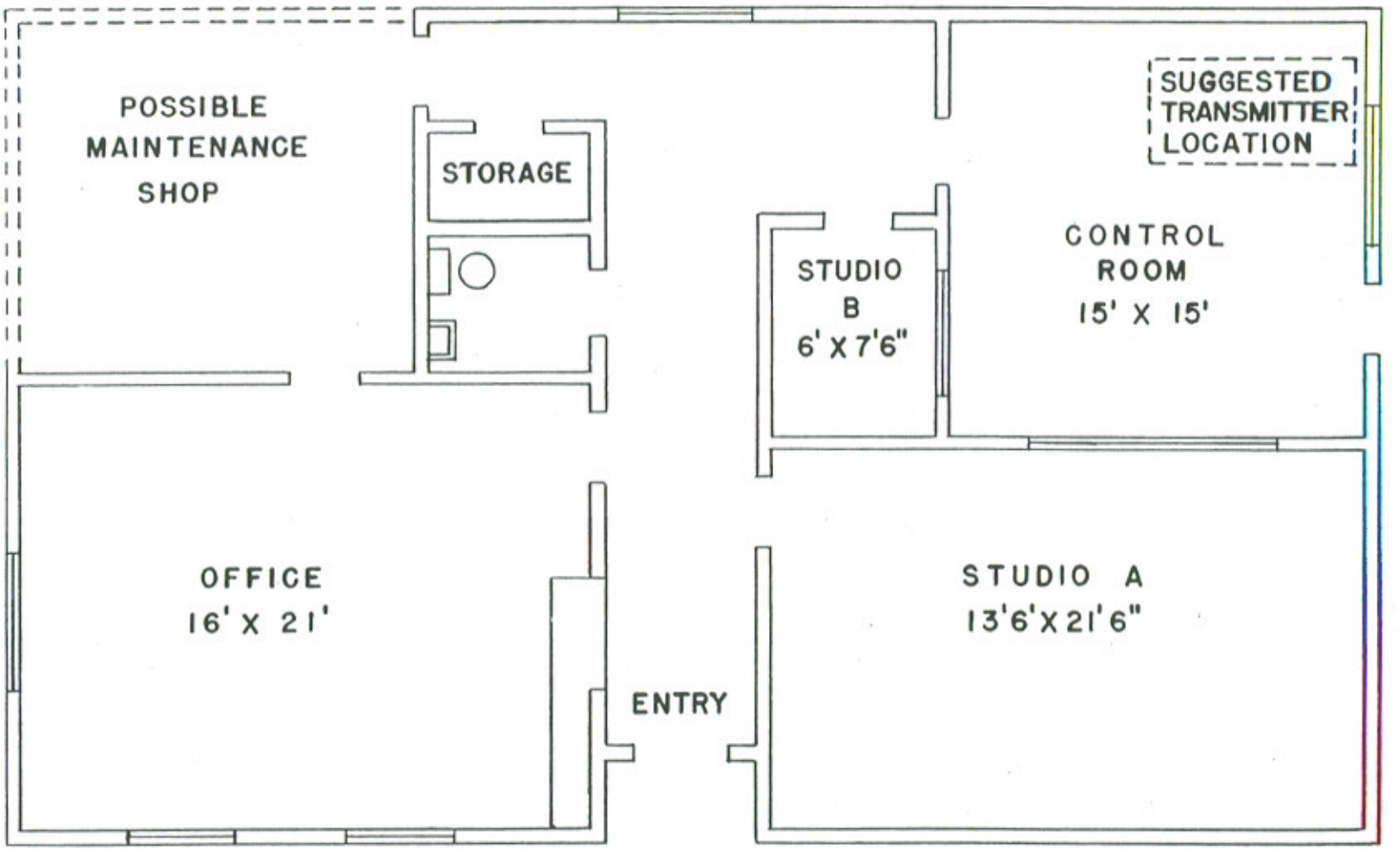
The number and size of the studios will depend largely on the type of programs to be broadcast. Usually, one studio and announce booth will serve the minimum requirements of a station. In addition, if further facilities are needed, the control room can be equipped for station break announcements and combination operation. As live programming increases, either in size or number of programs, the studio requirements will need to be modified. In general, studio areas should follow the desired proportions of 2:3:5 for height, width and length. Local conditions will determine what adjustments need to be made in these proportions. However, care should be taken to see that no two of the studio dimensions are the same.

Diagram "F" on page 32 shows a layout for a station which will producing small local live programs and will have its transmitter and antenna located at the same place as the studio. The studio is adequate for groups of 10 or 12 people. The announce booth is large enough to accommodate speaking programs with 2 or 3 people. The plan calls for a single control room serving both the studio and the announce booth. The approximate area for this layout is:

Studio A	300 sq. ft.
Announce booth	50 " "
Control room	225 " "
Music library	45 " "
Office	336 " "
Building service	315 " "

Another layout, not shown, is an arrangement whereby two different programs can be broadcast at the same time. By incorporating two control rooms in the plan, it is possible to be on the air from one studio and rehearsing or recording from the other. In dual station operation, each control room can be wired so that it can feed either transmitter. This plan calls for a remote location for the transmitter and antenna:

Studio A	900 sq. ft.
Studio B	400 " "



SUGGESTED RADIO STUDIO AND TRANSMITTER BUILDING

50' x 30'

SCALE 1' = 6'

DIAGRAM F

Studio C (Announce booth)	100	sq. ft.
Control room Studio A	200	" "
Master control room (Studio B & C)	300	" "
Music library	100	" "
Office	900	" "
Building service	600	" "

Local conditions and available materials will dictate what modifications need to be made in the station plans. These suggested areas might be called the ideal minimum space requirements. It is possible to operate from areas considerably less than the suggested size, but the program schedule will have to be reduced to fit the area. In stations which are mainly to be network or transcription relay stations, it is possible to operate from an announce booth and control room. In these cases, the most ambitious live program to be undertaken would probably be a local newscast.

Additional space may be required for heating and air conditioning equipment, in extreme temperature zones. It may be desirable to include an auditorium studio, or additional announce booths, as the program plans develop. If equipment and personnel are available, it is a good idea to plan a separate control room for each studio.

In planning a station, a location away from noise and vibration should be selected. The studio walls should be constructed as nearly soundproof as possible. If lighting and ventilation will permit, there should not be any openings, such as doors and windows, in these outside walls. For visual communication, there will need to be windows between the control rooms and studios. These should be made of double panes of glass, using ½ and ¼-inch plate glass, where possible. The two panes should be mounted in a sound-absorbing frame, so that the two surfaces are not parallel. This will serve to cut down on the light reflection between the two rooms. Entrance to the studio should be through a sound lock, consisting of two doors, separated by a small vestibule.

All surfaces in a room where microphones will be used need some acoustical treatment to reduce or increase the reverberation time.

The optimum reverberation time increases as the studio expands. In general, there are two ways of controlling this reverberation time — absorption and diffusion. In the early days of radio, the trend was to reduce this reverberation to a minimum by absorbing all the sound possible, making a "dead" studio. This resulted in voices and music that sounded dull and lifeless. From observation and practical experience, it has been recognized that some reverberation is necessary — there is an optimum point which sounds best over the air.

There are several general types of acoustical control materials — acoustical plaster, draperies and carpets, acoustical tiles, and membrane-covered absorbing materials. The selection of which of these to use will depend upon the type of treatment needed and the material available. Whatever type of material is used, it should be fireproof or fire resistant.

Acoustical plaster is not very practical for overseas installations. It is relatively low in sound-absorbing qualities, difficult to apply and has a poor resistance to abuse.

Draperies and carpets absorb high frequencies very well, but have little or no effect

upon lower frequencies. Their low frequency absorption can be increased by padding the carpets and lining and interlining the drapes. Lined drapes hung a foot or so from walls and backed up with several inches of rock wool, or similar acoustical material, will do a fair job of absorbing the low frequencies. Draperies are an economical and quick way to adjust studio acoustics for varying program conditions.

Acoustical tiles, which are probably the easiest to apply, provide fairly high absorption at medium and high frequencies. It is important to remember that these tiles lose from 20 to 60 percent of the their absorption qualities when they are painted.

Membrane-covered absorbing materials are perforated metal, asbestos board, or hard board, backed up by a highly absorbing material. This type of acoustical treatment is highly absorbent, up to about 4000 cycles, after which it becomes increasingly reflective. This surface can be painted several times without affecting its acoustical properties. It is rugged and will stand up under considerable abuse.

The final acoustics of a room should be considered when the room is first being designed as a studio. If possible, the 2:3:5 proportions should be maintained in selecting the room dimensions. A studio having these proportions will usually produce a fairly diffused sound field.

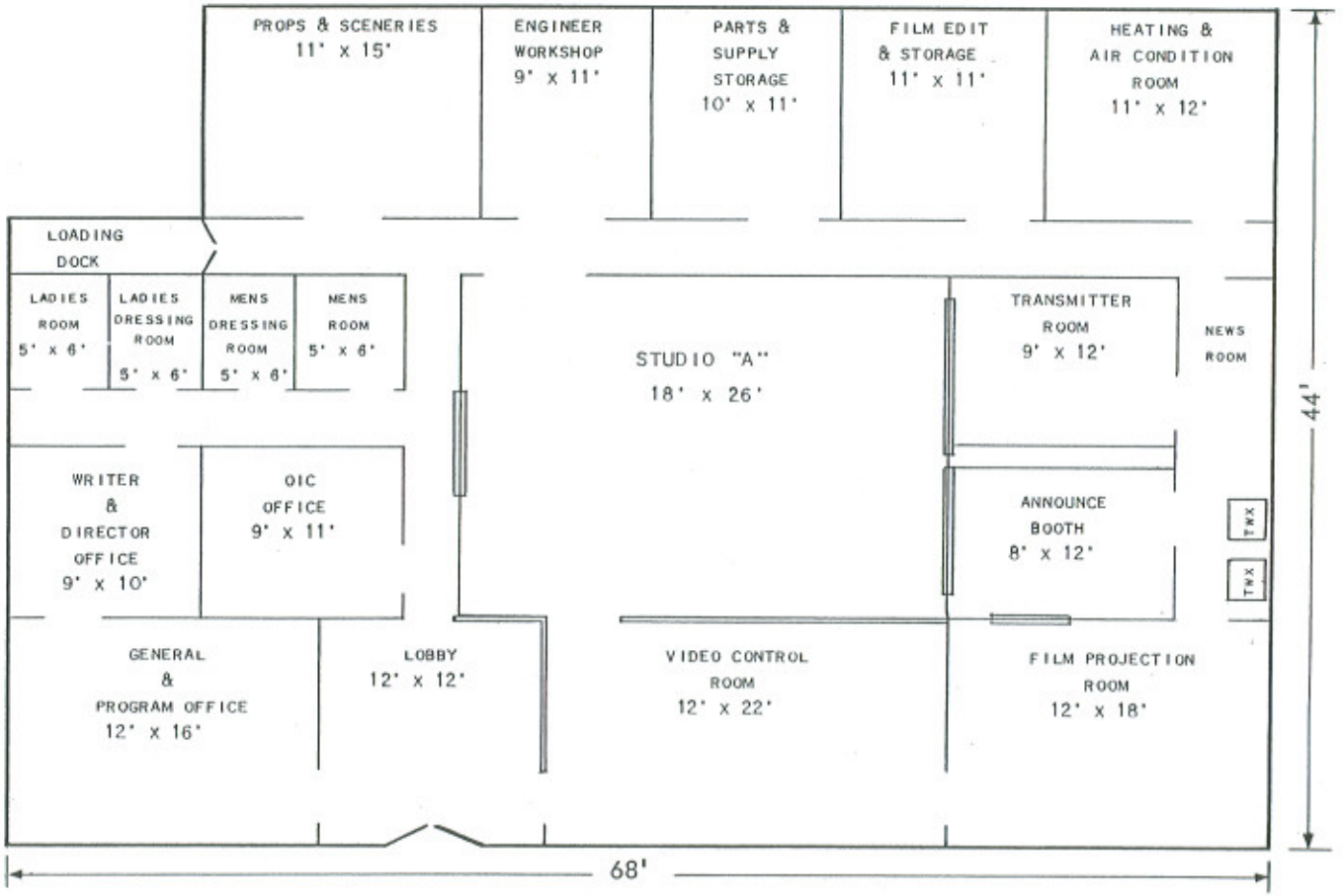
Sound is diffused by breaking up a normally flat reflective surface with splayed, serrated or curved surfaces. Surfaces which must remain parallel, like the ceiling and floor, can be treated so that one is highly absorbent and the other left normal. In the case of the ceiling and floor combination, either acoustical material can be put on the ceiling or a rug can be put on the floor. In either case, the opposite surface should be left bare. Side walls can be built curved or on an angle. It is important not to leave any large flat reflective surfaces opposite each other. It is equally important to have a studio that is not completely diffused, since this leads to a confusion of sound. To treat a studio properly, you need to absorb some of the sound and diffuse the rest.

The space requirements for administration of the station will be of two kinds — that necessary for the housekeeping chores and that necessary to carry on the programming of the station. The office requirements will depend upon how large a staff will be working at the outlet. The office space laid out earlier will accommodate a staff of 10 to 15.

REQUIREMENTS FOR A TELEVISION STATION

A television outlet will require considerably more space than is required for a radio station. Studio and control rooms will need to be larger to accommodate the video equipment. A minimum size studio should be 14'x 25' x 40'. A criss-cross light grid of 1¼" pipe should be located 12' from the floor. This grid should extend from wall to wall and the pipes should be located on 4' centers. A power distribution system for all present and future lighting instruments should be included in the grid. For a studio having floor dimensions 25' x 40', there should be approximately thirty individually controlled ceiling outlets, or one for every thirty square feet of floor space. In addition, there should be several individually controlled double outlets located on the walls of the studio. All of these circuits should be run into a switchboard, where they can be individually controlled by switches or dimmers. The studio light control board must be capable of supplying 20KW of fused power, or about 30 watts per square foot of studio floor space.

The grid can also be used for hanging drapes and other scenery. It is a good idea to mount drapery tracks around three sides of the studio. Drapes can be hung in such a



SUGGESTED TELEVISION STUDIO AND TRANSMITTER BUILDING

68' X 44'

SCALE 1'' = 10'

Diagram G

way that they can be moved behind various program sets easily. Drapes in a heavy dull gray are best. There may be sections of the drapes in varying shades of gray, giving the producer an option of a light or dark background. Any material can be used for drapes, as long at is does not have a smooth, glossy surface.

Acoustical treatment of a television studio generally follows that for radio studios, except it needs to be much more absorbent. Usually, a television studio is a "dead" studio. Besides the desirability of reducing the reverberation time, so the large room does not sound hollow, it is necessary to absorb considerably more noise. Many television productions call for a boom microphone. This means that the microphone will need to be from three to five feet from the speaker, necessitating an increase in the volume level of the audio console. Any noise caused by lens changes or the scuffling of feet, as the cameras are moved, will be picked up by the open mike, unless they are absorbed.

It is possible to operate from a smaller studio at first, where programs are limited to simple one-camera operations. However, a station's program schedule will soon outgrow these limited facilities and the original plans should take into consideration this probable growth. If the choice has to be made between one large studio or two small ones, it will be more practical to design one large studio similar to Diagram G on page 35, since this arrangement will be more flexible for staging programs. An enlarged announce booth can be included for a one-camera set-up — for news, interviews, or other simple talk programs.

In order to accommodate the video equipment, the control room will have to be somewhat larger than a radio control room. If the transmitter is to be located in the control room, even more space will be required. Then, too, space will be needed for additional engineer and production personnel in the television control room. It is a good idea to locate the studio lighting switchboard or panel where it can be operated during a program by the control room engineers. A room with 250 to 300 square feet of floor space should be adequate when the transmitter will be at another location. Double glass windows should be located so visual communication between the three rooms is possible. Other special areas include about 250 square feet for film storage, viewing, editing and handling. Another 1000 square feet will be needed for the construction and storage of properties and scenery.

DUCTWORK OR TRENCH PLANNING

The careful planning and layout of wiring trenches or ducts is essential to every station planner, once the amount of technical equipment has been determined accurately. It is practical to plan "trench runs" to accommodate the future addition of console sections, equipment racks and transmitter cabinets. No attempt is made in this chapter to illustrate complete station duct layouts. This is deemed as a consideration unique for each station and is, perhaps, best jointly solved by the station engineers and the TV equipment engineers involved.